BY ORDER OF THE COMMANDER
AIR FORCE MATERIEL COMMAND

AIR FORCE INSTRUCTION 21-103

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Maintenance

EQUIPMENT INVENTORY, STATUS, AND UTILIZATION REPORTING (AFMC MESL'S)

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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This document supplements (AFI) 21-103, *Equipment Inventory, Status, and Utilization Reporting.* This supplement provides the minimum essential systems and subsystems for AFMC test and test support aircraft. This supplement has been built to provide the Minimum Essential Subsytems List (MESL) that affects the various Mission Design Series (MDS) aircraft assigned to AFMC. They list the minimum essential systems and subsystems that must work on an aircraft for it to perform specifically assigned unit test or test support missions. For the purpose of this supplement two standard MESL mission codes are used; Developmental Test (DTE), which provides requirements for those aircraft undergoing test program/effort, and Developmental Test Support (DTS), which provides the requirements for those aircraft performing test support (i.e, photo/safety chase, proficiency/upgrade, test pilot school requirements, air show/demonstrations, etc.).

Attachment 17 (Added)

A-10A/OA-10A MINIMUM ESSENTIAL SUBSYTEM LIST

A-10A/OA-10A Minimum Essential Subsystems List (MESL)				BSL	
NO.	**WUC**	**SYSTEM/SUBSYSTEM**	**FSL**	**DTE**	**DTS**
1.	11***	Airframe	X	X	X
2.	12***	Cockpit	X	X	X
3.	13***	Landing Gear	X	X	X
4.	14***	Flight Controls	X	X	X
5.	23***	Power Plant	X	X	X
6.	24***	Auxiliary Power Plant	X	X	X
7.	41***	Air Conditioning/Press/ Anti-Ice	X	X[1]	X[1]
8.	41D/G***	Rain Removal/ Windshield Wash	X		X
9.	42***	Electrical System	X	X	X
10.	44***	Exterior Lighting	X[2]	X[2]	X[2]
11.	44***	Interior Lighting	X	X	X
12.	45***	Hydraulic & Pneumatic System	X	X	X
13.	46***	Fuel System	X	X	X
14.	47***	Oxygen System	X	X	X
15.	49***	Miscellaneous Utilities	X	X	X
16.	51***	Instruments	X	X	X
17.	51K***	Inertial Navigation System	X	X	X
18.	52***	Autopilot	X	X[10]	X
19.	55D***	Turbine Engine Monitoring System	X	X	X
20.	62***	VHF AM or FM Communications	X	X[8]	X
21.	63***	UHF Communications	X3	X[3,10]	X[3]
22.	63AD***	Direction Finder ADF/ARD	X		
23.	64***	Intercom	X	X[10]	X
24.	65***	IFF/SIF	X	X	X
25.	69***	Miscellaneous Comm	X3	X[10]	X[3]
26.	71***	Radio Navigation	X	X	X
27.	72***	Radar Navigation Altimeter System	X	X9	X
28.	74B***	INS-HUD	X	X	X
29.	74C***	Target Ident-Pave Penny	X	X[10]	X
30.	74D***	Gun Camera System	X	X[10]	X
31.	74E/F***	TV Monitor	X	X[4,7,10]	X
32.	74G***	Cockpit TV Sensor / AVTR System	X	X[10]	X
33.	74H***	LASTE/INS-HUD	X	X	X
34.	75***	Weapons Delivery	X	X5,[10]	X
35.	75A***	Gun System	X	X[10]	X
36.	76D***	ALE-40 System	X	X[6,10]	X

37.	76E***	ALR-69 System	X	X[10]	X
38.	91***	Emergency Equipment	X	X	X
39.	97***	Explosive Devices	X	X	X

QUALIFYING NOTES:

1. Manual Mode Only Required.
2. Landing Lights and Strip Lights or Formation Light Required as a Minimum for PMC.
3. Have Quick/Secure voice Capable if Equipped.
4. Required on TGM Equipped Aircraft.
5. Stations 1 or 11 Must be ECM Pod Capable and AIM-9 Capable if Equipped.
   Stations 3,4,6,8 and 9 Must be Capable.
6. Three of the Four 76D Subsystems Must be Operational.
7. Required on TGM Equipped Aircraft for Night Search Capability.
8. UHF or VHF Required; Have Quick/Secure Voice Not Required.
9. Required for Low Level NAV/Weapons Delivery Below 5000 feet.
10. Test Mission Dependent.

Attachment 18 (Added)

F-15A/B/C/D MINIMUM ESSENTIAL SUBSYTEMS LIST

F-15A/B/C/D Minimum Essential Subsystems List (MESL)				BSL	
NO.	**WUC**	**SYSTEM/SUBSYSTEM**	**FSL**	**DTE (see note 1)**	**DTS (see note 1)**
1	11000	Airframe	X	X	X
2	12000	Cockpit and Fuselage Compartments	X	X	X
3	13000	Landing Gear	X	X	X
4	14000	Flight Controls	X	X	X
5	23000	Turbofan Power Plant	X	X	X
6	24000	Auxiliary Power Plant	X	X	X
7	41000	Air Conditioning/Pressurization	X	X [2]	X [2]
8	42000	Electrical Power Supplement	X	X	X
9	44A00	Exterior Lighting	X 3	X [4]	X [4]
10	44B00/E	Interior Lighting/Caution Light Panel Assembly	X	X	X
11	45000	Hydraulic System	X	X	X
12	46000	Fuel System	X	X	X
13	47000	Oxygen System	X	X	X
14	49000	Miscellaneous Utilities	X	X	X
15	51000	Instruments	X	X	X
16	52000	Autopilot	X	X[9]	X
17	52A00	Control Augmentation System	X	X	X
18	55000	Malfunction Analysis and Recording	X	X	X
19	55A00/E	Built-in Test Display Group	X	X	X
20	57000	Integrated Guidance and Flight Control System	X	X	X
21	63A00	UHF Communications	X	X [5]	X [5]
22	63B00	Integrated CNI Control Set	X	X	X
23	63C00	Intercommunication System	X [6]	X [6]	X [6]
24	65000	IFF	X	X	X
25	71B00	Direction Finder Group	X	X[9]	X[9]
26	71C00	Instrument Landing Set	X	X	X
27	71F00	Attitude Heading Reference Set	X [8]	X [8]	X [8]
28	71G00	Global Positioning System (EGI)	X [8]	X [8]	X [8]
29	71M00	Inertial Navigation System (RLG)	X	X	X
30	71Q00	Fighter Data Link	X [8]	X[9]	X [9]
31	71Z00	Tactical Air Navigation Set	X	X	X
32	74000	Fire Control System	X	X[9]	X
33	74F/G/H	Radar Set - AN/APG-63/70/63(V)1	X	X[9]	X [9]
34	74K00	HUD Set	X	X	X
35	74L00	Video Tape Recorder System	X	X[9]	X
36	74T00	Joint Helmet Mounted Cueing System	X [8]	X [8]	X [8]

37	75000	Weapons Delivery	X	X [7]	X [7]
38	75H00	Gun System	X [8]	X [9]	X [8]
39	76A00/B	Radar Warning Receiver ALR-56 (A/C models)	X [8]	X [9]	X [8]
40	76C00	Interface Blanker	X	X[9]	X
41	76G00	Electronic Warfare Warning Set (ALQ-128)	X [8]	X[9]	X [8]
42	76H00/M	ALQ-135 Band 1, 2, and 3	X [8]	X[9]	X [8]
43	76K00	Countermeasures Dispenser	X [8]		X [8]
44	76N00	Fiber Optic Towed Decoy	X [8]		X [8]
45	91000	Emergency Equipment	X	X[9]	X
46	97000	Explosive Devices and Components	X	X[9]	X
47		Instrumentation System {ATIS/(Mini-)AATIS}	X [8]	X[9]	X [8]
48		Analog Data Recorder	X [8]	X[9]	X [8]
49		Digital Data Recorder (MARS 2/2E)	X [8]	X[9]	X [9]
50		Telemetry System	X [8]	X[9]	X [9]
51		IRIG Time Set	X [8]	X[9]	X [9]
52		Flight Test Video Recorder	X [8]	X[9]	X [9]
53		TSPI (ARDS, GAINR)	X [8]	X[9]	X [9]

NOTES:

1. Applies to aircraft in assignment code CB, EI and EH.
2. Manual mode only required for PMC.
3. As required by AFI 11-218.
4. Strip lights and landing lights required as a minimum for PMC.
5. HAVE QUICK/Secure Voice test dependent.
6. Applies to B/D models only if both cockpits occupied.
7. Only AIM-7/AIM-9 stations required for test for FMC.
8. If installed.
9. Test dependent. As determined by test director based on mission objectives.

Attachment 19 (Added)

F-15E MINIMUM ESSENTIAL SUBSYTEMS LIST

F-15E Minimum Essential Subsystems List (MESL)				BSL	
NO.	**WUC**	**SYSTEM/SUBSYSTEM**	**FSL**	**DTE (see note 1)**	**DTS (see note 1)**
1	11000	Airframe	X	X	X
2	12000	Cockpit and Fuselage Compartments	X	X	X
3	13000	Landing Gear	X	X	X
4	14000	Flight Controls	X	X	X
5	23000	Turbofan Power Plant	X	X	X
6	24000	Auxiliary Power Plant	X	X	X
7	41000	Air Conditioning/Pressurization	X	X [2]	X [2]
8	42000	Electrical Power Supplement	X	X	X
9	44A00	Exterior Lighting	X 3	X [4]	X [4]
10	44B00/E	Interior Lighting/Caution Light Panel Assembly	X	X	X
11	45000	Hydraulic and Pneumatic Power Supply Systems	X	X	X
12	46000	Fuel System	X 5	X [5]	X [5]
13	47000	Oxygen System	X	X	X
14	49000	Miscellaneous Utilities	X	X	X
15	51000	Instruments	X	X	X
16	52000	Autopilot	X	X[12]	X
17	52B00	Automatic Flight Control (Augmentation) Set	X	X	X
18	55000	Malfunction Analysis and Recording	X	X	X
19	55A00	Built-in Test Display Group	X	X	X
20	57000	Integrated Guidance and Flight Control System	X	X	X
21	63A00	UHF Communications	X	X [6]	X[6]
22	63B00	Integrated CNI Control Set	X	X	X
23	63C00	Intercommunication System	X	X	X
24	65000	IFF	X	X	X
25	71B00	Direction Finder Group	X		X
26	71C00	Instrument Landing System	X	X	X
27	71F00	Attitude Heading Reference Set	X	X	X
28	71G00	Global Positioning System (EGI)	X[11]	X[12]	X[11]
29	71M00	Inertial Navigation System (RLG)	X	X	X
30	71Q00	Fighter Data Link	X	X[12]	X[11]
31	71Z00	Tactical Air Navigation Set	X	X	X
32	72A00	CARA AN/APN-232	X	X[12]	X
33	74G00	Radar Set - AN/APG-70	X	X[12]	X
34	74K00	HUD Set	X	X	X
35	74L00	Video Tape Recorder System	X	X[12]	X[11]
36	74M00	Multipurpose Display System	X [7]	X [7]	X [7]

37	74N00	LANTIRN Targeting Set	X [8]	X [12]	X [8]
38	74P00	LANTIRN Navigation Set	X [8]	X [12]	X [8]
39	74T00	Joint Helmet Mounted Cueing System	X [11]	X [12]	X [11]
40	75000	Weapons Delivery	X [9]	X [10]	X [10]
41	75H00	Gun System	X [11]	X [11, 12]	X [11]
42	76A00/B	Radar Warning Receiver (ALR-56C)	X [11]	X [11, 12]	X [11]
43	76C00	Interface Blanker	X	X[12]	X
44	76G00	Electronic Warfare Warning Set ALQ-128	X [11]	X [11, 12]	X[11]
45	76H00/L/M	ALQ-135 Band 1.5 and 3	X [11]	X [11, 12]	X[11]
46	76N00	Fiber Optic Towed Decoy	X [11]	X [11, 12]	X[11]
47	76K00	Countermeasures Dispenser	X [11]	X [11, 12]	X[11]
48	82A00	Remote Map Reader	X [11]	X [11, 12]	X [11]
49	82B00	Digital Mapping System	X [11]	X [11, 12]	X [11]
50	91000	Emergency Equipment	X	X	X
51	97000	Explosive Devices	X	X	X
52		Instrumentation Sys {ATIS/(Mini-)AATIS}	X [11]	X [12]	X[11]
53		Analog Data Recorder	X [11]	X [12]	X[11]
54		Digital Data Recorder (MARS 2/2E)	X [11]	X [12]	X[11]
55		Telemetry System	X [11]	X [12]	X[11]
56		IRIG Time	X [11]	X [12]	X[11]
57		Flight Test Video	X [11]	X [12]	X[11]
58		TSPI (ARDS, GAINR)	X [11]	X [12]	X[11]

NOTES:

1. Applies to aircraft in assignment code CB, EI and EH.
2. Manual mode only required for PMC.
3. As required by AFI 11-202, Volume 3, and 11-218.
4. Strip lights and landing lights required as a minimum for PMC.
5. Includes Conformal Fuel Tanks if assigned to unit.
6. HAVE QUICK/Secure Voice required if deemed necessary for test objectives. See NOTE 12.
7. Seven multipurpose displays are required.
8. Aircraft systems must be capable of LANTIRN operation to be FMC regardless of pod installation.
9. Eight missile and 15 air-to-ground station capability is required for FMC.
10. Any six missile stations, of which two are LAU-128 capable and eight CFT air-to-ground stations are required for PMC.
11. If installed.
12. Test dependent. As determined by test director based on mission objectives.

Attachment 20 (Added)

F-16A/B/C/D MINIMUM ESSENTIAL SUBSYTEMS LIST

F-16A/B/C/D Minimum Essential Subsystems List (MESL)				BSL	
NO.	**WUC**	**SYSTEM/ SUBSYSTEM**	**FSL**	**DTE**	**DTS**
1	11000	Airframe	X	X	X
2	12000	Crew Station System	X	X	X
3	13000	Landing Gear System	X	X	X
4	14000	Flight Control System	X	X[1]	X[1]
5	23000	Turbofan Power Plant (PW Engine)	X	X	X
6	24000	Aux Power Plant/JFS	X	X	X
7	27000	Turbofan Power Plant (GE Engine)	X	X	X
8	41000	Environmental Control System	X[2]	X[2]	X[2]
9	42000	Electrical Power Supply	X	X[3]	X[3]
10	44A00	Exterior Lighting	X[4, 14]	X[5, 14, 15]	X[4, 14]
11	44B00/C	Interior Lighting	X	X	X
12	45000	Hydraulic & Pneumatic System	X	X	X
13	46000	Fuel System	X	X	X
14	47000	Oxygen System	X	X[6]	X[6]
15	49A00	Fire Detection System	X	X	X
16	49B00	Overheat Detection System	X	X	X
17	51000	Flight Instruments	X	X[7]	X[7]
18	61000	HF Communications	X	X[16]	X[16]
19	62000	VHF Communications	X[8]	X[16]	X[16]
20	63000	UHF Communications	X[8]	X[15, 16]	X[15, 16]
21	64000	Interphone System	X	X[9]	X
22	65000	IFF	X	X	X
23	69AD0	Improved Data Modem (IDM) /Situation Awareness Data Link (SADL)	X[11]	X[16]	X[11]
24	71000	Radio Navigation	X	X	X
25	71D00	Global Positioning System (GPS)	X[11]	X[16]	X[11]
26	74000	Fire Control System	X	X[16]	X
27	74G00	Airborne Video System	X[11]	X[16]	X[11]
28	74H00	Data Transfer Unit	X	X[17]	X
29	74L00	Radar Altimeter System	X	X[10]	X
30	74N00	Targeting Pod (GTP) System	X[12]	X[12, 16, 18]	X[12]
31	74P00	Navigation Pod (VP) System	X[12]	X[12, 16, 19]	X[12]
32	74R00	HARM Targeting System (HTS)	X[17]	X[16]	X[17]
33	75000	Weapons Delivery System	X	X[13, 16]	X
34	75A00	Gun System	X	X[16]	X

35	76000	Electronic Counter Measures	X	X[16]	X
36	76B00/C	Radar Warning Receiver	X	X[16]	X
37	76Y00	Chaff/Flare Disp. System	X	X[16]	X
38	91000	Emergency Equipment	X	X	X
39	97000	Explosive Devices and Components	X	X	X

NOTES:

1. Excludes Indicator Override, Leading Edge Flap Indicator and Speed Brake Indicator.
2. Manual mode only required.
3. Excludes External Power System.
4. As required by AFI 11-218.
5. Minimum Navigation/Formation light requirements for PMC include one Anti-Collision, one Anti-Collision and one Position Light per wing, Both Inlet Light and Tail Navigation Light Landing and Taxi

   Lights required as a minimum for PMC.
6. Excludes Quantity Check Switch.
7. Excludes Secondary Instruments and RCP Accelerometer.
8. Have Quick/Secure Voice required if aircraft is equipped.
9. Applies To B/D models only.
10. Required for aircraft performing the LANTIRN mission only.
11. If equipped.
12. Aircraft systems must be capable of LANTIRN operation to be FMC, regardless of Pod operation.
13. For Air-to-Air all four outboard Stations (1, 2, 8, And 9) are required for FMC. Three of four outboard Stations (1, 2, 8, And 9) of which at least two are LAU-129 capable are required for PMC.

    For Air-to-Surface, all four Inboard Stations (3, 4, 6, and 7) are required for FMC/PMC.
14. For NVIS modified aircraft, External Lighting covert function must be operational.
15. As required by AFI 11-218 and AFI 11-202, Vol-3.
16. Test dependent. As determined by test director based on mission objectives.
17. HTS/IAMS only.
18. N/A for Block 10/15/50/52.
19. Block 40/42 only.

Attachment 21 (Added)

Y/F-117A MINIMUM ESSENTIAL SUBSYTEMS LIST

Y/F-117A Minimum Essential Subsystems List (MESL)				BSL	
NO.	**WUC**	**SYSTEM/SUBSYSTEM**	**FSL**	**DTE**	**DTS**
1	11000	Airframe	X	X	X
2	12000	Cockpit	X	X	X
3	13000	Landing Gear	X	X	X
4	14000	Flight Controls	X	X	X
5	23000	Powerplants	X	X	X
6	24000	Auxiliary Powerplant	X	X	X
7	41000	Air Conditioning/Defrost System	X	X	X
8	42000	Electrical Power Supply	X	X	X
9	44000	Lighting System	X	X [1]	X[1]
10	45000	Hydraulic Power Supply	X	X	X
11	46000	Fuel System	X	X	X
12	47000	Oxygen System	X	X	X
13	49000	Miscellaneous Systems	X	X	X
14	51000	Instruments	X	X	X
15	52000	Autopilot	X	X	X
16	55000	Malfunction Analysis & Recording Equipment	X	X	X
17	57000	Integrated Guidance	X	X	X
18	63000	UHF System	X	X	X
19	64000	Intercom	X	X	X
20	65000	IFF	X	X[2]	X[2]
21	71000	Radio Navigation	X	X[2, 3]	X[2, 3]
22	73000	Bombing Navigation	X	X[4]	X[4]
23	75000	Weapons Delivery	X	X	X
24	82000	Computer & Data Display	X	X	X
25	91000	Emergency Equipment	X	X	X
26	93000	Drag Chute Equipment	X	X	X
27	97000	Explosive Items	X	X	X
28	98000	Low Observables	X	X[5]	X[5]
29	99000	Special Instrumentation	X	X[6]	X[6]

NOTES:

1. As required by AFI 11-218.
2. Top or bottom antenna must be operational.
3. Left or right antenna must be operational.
4. Test dependent. As determined by test director based on mission objectives.
5. Only areas designated as safety of flight critical.
6. Some instrumentation measurements may affect safety of flight systems when non-powered.

Attachment 22 (Added)

AT/T-38A/B/C MINIMUM ESSENTIAL SUBSYTEMS LIST

AT/T-38A/B/C Minimum Essential Subsystems List (MESL)				BSL	
NO.	**WUC**	**SYSTEM/SUBSYSTEM**	**FSL**	**DTE**	**DTS**
1	11***	Airframe	X	X	X
2	11***	Windshield/Canopy	X	X	X
3	1152*	Pylon	X (T-38B)	X[2]	X[1]
4	121**	Cockpit and Controls	X	X	X
5	13***	Landing Gear and Brakes	X	X	X
6	14***	Flight controls	X	X	X
7	23***	Turbojet Powerplant/Gearboxes	X	X	X
8	41***	Air Conditioning/Pressurization/Anti-Ice Control	X	X	X
9	42***	Electrical System	X	X	X
10	4411*	Exterior Lights	X[3]	X[3]	X[3]
11	442**	Interior Lights	X[4]	X[4]	X[4]
12	45***	Hydraulic and Pneumatic Power	X	X	X
13	46***	Fuel System	X	X	X
14	47***	Oxygen System	X	X	X
15	49***	Miscellaneous Utilities	X	X[2]	X
16	511**	Instruments	X	X	X
17	51111	Accelerometer	X	X[2]	X
18	51211	Clock	X	X[2]	X
19	513**	Angle of Attack (AOA)	X	X[2]	X
20	552**	AVTR	X[5]	X[2]	X[2]
21	55B**	Recording Equipment	X[5]	X[2]	X[2]
22	63B**	UHF Radio, AN/ARC-164	X	X	X
23	64B**	Interphone, AN/AIC-18	X	X	X
24	65A**	IFF	X	X	X
25	65C**	AIMS, AN/APX-64	X	X	X
26	71B**	Instrument Landing System	X	X[2]	X[1]
27	71Z**	TACAN	X	X[2]	X[1]
28	742**	Optical Sight	X (T-38B)	X[2]	X[1]
29	75***	Weapon Delivery	X (T-38B)	X[2]	X[1]
30	91***	Emergency/Personnel Equipment	X	X	X
31	97***	Egress System	X	X	X
32		DAS	X[5]	X [2]	X[5]
33		Telemetry System	X[5]	X [2]	X[5]
34		IRIG Time Set	X[5]	X [2]	X[5]
35		Flight Test Video Recorder	X[5]	X [2]	X[5]
36		TSPI	X[5]	X [2]	X[5]

NOTES:

1. IMC or Cross Country sorties require either a TACAN/ILS equipped aircraft, or T-38C (if applicable).
   ACBT sorties require a TACAN aircraft with Gunsight, or T-38C aircraft (if applicable).
   Air-to-Ground sorties require AT-38B with pylon.
2. Test dependent. As determined by test conductor based on mission objectives.
3. Landing and Taxi light portion of the system is required for all flights.
   Restricted to day only if only one beacon operates, both beacons must be operational for night missions.
4. As required by AFI 11-218 and 11-202 V3.
5. If installed.

Attachment 23 (Added)

NT-39A/B MINIMUM ESSENTIAL SUBSYTEMS LIST

NT-39 A/B Minimum Essential Subsystems List (MESL)				BSL	
NO.	**WUC**	**SYSTEM/SUBSYSTEM**	**FSL**	**DTE**	**DTS**
1	11000	Airframe	X	X	X
2	11***	Windshield/Canopy	X	X	X
3	12100	Cockpit and Controls	X	X	X
4	13000	Landing Gear and Brakes	X	X	X
5	14000	Flight controls	X	X	X
6	14***	Warning Horn and Cutout Switch	X	X	X
7	14***	Stabilizer Trim Control Switches	X[2]	X[2]	X[2]
8	14***	Electric Trim Motor	X	X	X
9	14***	Flap Position Indicators	X	X	X
10	23000	Turbojet Powerplant	X	X	X
11	23***	Pt5 Gauges	X	X	X
12	23***	Tachometer	X[1]	X[1]	X[1]
13	23***	EGT Gauge	X	X	X
14	23***	Fuel Flow Meter	X[1]	X[1]	X[1]
15	23***	Oil Pressure Gauges	X	X	X
16	23***	Low Oil Pressure Warning Light	X	X	X
17	23***	Oil Overheat Caution Lights	X	X	X
18	23***	Fire & Overheat Detection & Extinguishing	X	X	X
19	41000	Air Conditioning/Pressurization/Anti-Ice Control	X	X	X
20	41***	Window Heat	X	X[6]	X[6]
21	41***	Windshield Wiper System	X	X[7]	X[7]
22	41***	Air Conditioning Temperature Control	X[3]	X[3]	X[3]
23	41***	Cabin Altitude Gauge	X	X	X
24	41***	Cabin Pressure Warning Light	X		X
25	42000	Electrical System	X	X	X
26	42***	AC Generator System (T-39B)	X	X	X
27	42***	Standby Inverter	X		
28	42***	Main Inverter (T-39A)	X	X	X
29	42***	Generator Failure Light	X	X	X
30	42***	Generator Voltmeter	X	X	X
31	42***	AC Voltmeter	X	X	X
32	42***	Frequency Meter	X	X	X
33	42***	Switched DC Bus	X	X	X
34	44110	Exterior Lights	X		
35	44***	Position Lights	X	X[10]	X[10]
36	44***	Strobe Lights	X	X[11]	X[11]

37	44***	Landing Lights	X	X[11]	X[11]
38	44***	Taxi Lights	X	X[12]	X[12]
39	44***	Terrain Light	X		X[9]
40	44200	Interior Lights	X		
41	45000	Hydraulic and Pneumatic Power	X	X	X
42	46000	Fuel System	X	X	X
43	46***	Boost Pumps	X	X	X
44	46***	Total Fuel Quantity	X[4]	X[4]	X[4]
45	46***	Fuel Low Pressure Warning Lights	X		
46	46***	Fuel Dump System	X		
47	47000	Oxygen System	X	X	X
48	47***	MA-1 Portable Oxygen Bottles	X	X	X
49	47***	Oxygen Regulators	X	X	X
50	49000	Miscellaneous Utilities	X	X	X
51	49***	Emergency Alarm Bell	X	X[13]	X[13]
52	49***	EEBDs	X	X[8]	X[8]
53	49***	Fire Extinguishers	X	X	X
54	49***	Door Warning Light	14	14	14
55	51100	Flight Instruments	X	X	X
56	51111	Accelerometer	X		
57	51211	Clock	X		
58	513**	Angle of Attack (AOA)	X	X	
59	51***	Mach Indicators	X		
60	51***	Indicated Airspeed Indicators	X	X	X
61	51***	Vertical Velocity	X		
62	51***	Barometric Altimeters	X	X	X
63	51***	Radio Altimeter	X		
64	51***	Outside Air Temperature Gauge	X		
65	51***	Pitot Static Heat	X	X	X
66	51***	ADI	X	X	X
67	55200	AVTR	X	X[9]	X
68	55B00	Recording Equipment	X	X[9]	X
69	63B00	UHF Radio	X	X[8]	X[8]
70	63000	VHF Radio	X	X[9]	X[9]
71	64B00	Interphone	X		
72	65A00	IFF	X	X	X
73	65***	C-Band Beacon	X		
74	71B00	Instrument Landing System	X		X
75	71Z00	TACAN	X		
76	71***	Magnetic Compass	X		X
77	71***	RMI	X		
78	71***	HSI	X	X	X
79	71***	VOR	X		

80	76000	Weather Radar	X	X[9]	X[5]
81	91***	Emergency/Personnel Equipment	X	X	X

NOTES:

1. One may be inoperative after engine start provided all other indicators for affected engine are operating normally.
2. The trim switch must operate for the pilot flying for takeoff.
3. Automatic or manual mode must be operable.
4. Total fuel may be computed manually.
5. Required if thunderstorms or hazardous conditions that can be detected by airborne radar are forecast or exist along route of flight.
6. Pilot and Co-pilot #1 and #2 windows must operate.
7. At least one wiper must be operational for flights into forecast precipitation at arrival or departure base.
8. One of two must be operational.
9. Test dependent. As determined by test director based on mission objectives.
10. Both wingtip lights and one tail light must be operative.
11. One of two must be operational, but consider night visibility.
12. One taxi or terrain light must be operative for night operations.
13. Requires special passenger brief if inoperative.
14. Crew entry and cargo door must be visually verified secured.

Attachment 24 (Added)

UH-1N MINIMUM ESSENTIAL SUBSYTEMS LIST

UH-1N Minimum Essential Subsystems List (MESL)				BSL	
NO.	**WUC**	**SYSTEM/SUBSYSTEM**	**FSL**	**DTE**	**DTS**
1	12A00	Cargo Suspension System	X		
2	12B00	Litter Kit	X		
3	12C00	Troop Seats	X		
4	12E	Windshield Wiper	X	X	X
5	13210	Ground Handle Wheels	X		
6	22BAE	Fuel Flow Indicator	X	X	X
7	41100	Bleed Air Heat and Ventilation	X		X
8	42310	AC Power Supply	X	X[1]	X[1]
9	42510	Electrical Power Indicator	X	X	X
10	44110	Dome Lights	X		
11	44120	Instrument Panel Lights	X	X[4]	X[4]
12	44130	Instruments Secondary Lights	X	X[4]	X[4]
13	44140	Pedestal Lights	X	X[4]	X[4]
14	44150	Overhead Console Lights	X	X[4]	X[4]
15	44160	Utility Lights	X		
16	44210	Navigation Lights	X	X	X
17	44230	Landing Light	X	X[3]	X[3]
18	44250	Search Light	X	X[3]	X[3]
19	44300	Caution Lights	X	X	X
20	44500	Strobe Lights	X	X	X
21	4611E	Fuel Boost Pump	X	X	X
22	4613C	Fuel Quantity Indicator	X	X[6]	X[6]
23	46300	Auxiliary Fuel System	X	X[6]	X[6]
24	49200	Rescue Hoist	X		
25	49300	Forrest Penetrator	X		
26	49500	Stokes Litter	X		
27	51100	Flight Instruments	X	X[2]	X[2]
28	51120	Pitot Static System	X	X	X
29	51210	Gyro Compass	X	X[2]	X[2]
30	51220	Standby Compass	X	X[6]	X[6]
31	5131A	Free Air Temperature Indicator	X		
32	5131B	Clock	X		
33	62000	VHF Radio	X	X[5]	X[5]
34	63000	UHF Radio	X	X[5]	X[5]
35	64000	Interphone System	X	X	X
36	65000	Identify Friend or Foe (IFF)	X	X[6]	X[6]

46	68000	Global Positioning System	X	X[6]	X[6]
37	71110	UHF/DF	X	X[6]	X[6]
38	71Z00	Tacan	X	X[6]	X[6]
39	71320	VOR/ILS	X	X[6]	X[6]
40	7121Q	Course Indicator	X	X[6]	X[6]
41	71510	Marker Beacon	X	X[6]	X[6]
42	91210	Passenger Alarm	X		
43	9131A	Medical Kit	X	X	X
44	9131B	Cabin Fire Extinguisher	X	X	X
45	9711B	Hoist Guillotine Squib	X		

NOTES:

1. Only one inverter and generator required.
2. Pilot's instruments required.
3. WUCs 44230 and 44250 one or the other required for night missions
4. Required for night missions only.
5. Either UHF or VHF required.
6. Test dependent. As determined by test director based on mission objectives.

Attachment 25 (Added)

C-17 MINIMUM ESSENTIAL SUBSYTEMS LIST

C-17 Minimum Essential Subsystems List (MESL)				BSL	
NO.	**WUC**	**SYSTEM/SUBSYSTEM**	**FSL**	**DTE**	**DTS**
1	11000	Airframe	X	X	X
2	11ABO	Crew Entry Door Assembly	X	X[5]	X
3	11BJA	Pressure Vent Door Assembly	X	X[6]	X
4	11BKO	Cargo Door Hydraulic System	X	X[7]	X
5	11BLO	Cargo Ramp Hydraulic System	X	X[8]	X
6	12000	Cockpit and Fuselage Compartments	X	X	X
7	12CDE	Logistic Lock Control Panel	X	4	X
8	12RDB	Pilot Seat Inertia Reel Assembly	X	X	X
9	12REB	Copilot Seat Inertia Reel Assembly	X	X	X
10	12RFB	Alternate Crew Member Seat Inertia Reel Assembly	X	X[2]	X
11	12RGB	Loadmaster Seat Inertia Reel Assembly	X	X	X
12	13000	Landing Gear	X	X	X
13	13***	Landing Gear Position Indicators	X	X	X
14	13JCA	Wheel Brakes	X	X	X
15	13JGA	Anti-Skid System	X	X	X
16	13JGA	Anti-Skid Control Unit	X	X	X
17	13KAA	Steering Control Wheel Assembly	X	X	X
18	13KCA	NLG Steering Cylinder	X	X	X
19	13***	Landing Gear Handle Warning Lights	X	X	X
20	14000	Flight Controls	X	X	X
21	14CEB	Actuator, Pitch Autopilot Follow-up	X	X[1]	X
22	14AFA	Actuator, Roll, Autopilot Follow-up	X	X[1]	X
23	14ALO	Aileron, Rudder, Elevator Trim Control Panel Assembly	X	X	X
24	14AFD	Rudder Trim Position Indicator	X	X	X
25	14AFD	Aileron Trim Position Indicator	X	X	X
26	14AFD	Pitch Trim Position Indicator	X	X	X
27	14EEB	Flap Index Position Indicator	X	X	X
28	14EEC	Flap Position Standby Indicator	X	X	X
29	14FGB	Speed Brake Position Indicator	X	X[3]	X
30	14BGC	Rudder Position Sensor	X	X	X
31	23000	Turbofan Propulsion System (F-117-PW1100)	X	X	X
32	23***	Thrust Reversers	X	X	X
33	23***	Thrust Reverser Lights	X	X	X
34	23***	Engine Ignition (A/B)	X	X	X
35	23PAL	Autothrottle Disengage Switch	X		X
36	23PAP	Takeoff/Go Around Switch (TO/GA)	X	X	X

37	23PAB	Autothrottle Actuator	X	X[9]	X
38	23NCO	Engine Fuel Pumps	X	X	X
39	23NEO	Engine Electronic Control (EEC)	X	X[11]	X
40	23NFO	P2/T2 Probes	X	X	X
41	23NJO	EEC Fuel Temperature Probe	X	X[12]	X
42	23NKO	EEC Oil Temperature Probe	X	X[13]	X
43	23NNO	Main Fuel Control	X	X	X
44	23NJO	Fuel Flow Transmitter	X	X	X
45	23RAO	Engine Ignition Exciter	X	X[14]	X
46	23PAO	Throttle Module	X	X	X
47	23YAO	Thrust Reverser Control Valve	X	X[15]	X
48	24AOO	Auxiliary Power Unit	X	X[10]	X
49	41000	Air Conditioning, Cabin Pressurization	X	X	X
50	41BCO	Environmental Control System Panel	X	X	X
51	41ANA	Cargo Compartment Recirculation Fan	X	X	X
52	41ECH	Cabin Pressure Selector Panel	X	X	X
53	41ECA	Cabin Pressure Indicator Panel	X	X[16]	X
54	41AAO	Air Conditioning Pack	X	X[17]	X
55	41BAO	Environmental Control System Controller	X	X	X
56	41GAA	Wing Ice Protection	X		X
57	41GEA	Windshield Ice Protection Controller	X	X[18]	X
58	41GGA	Window Defog Controller	X	X[19]	X
59	41CCE	Precooler Exit Temperature Sensor	X	X	X
60	41CAM	Isolation Valve Pushbutton Switch light	X	X	X
61	41CAN	APU Flow Control Pushbutton Switch light	X	X	X
62	41CAD	Isolation Valve	X	X[20]	X
63	41CAH	APU Check Valve	X		X
64	41CAV	Wing Manifold Pressure Sensor	X	X	X
65	41DAO	Failure Detection Manifold Controller	X	X	X
66	41DCA	Manifold Failure Overheat Sensor Element	X	X	X
67	42000	Electrical System	X	X	X
68	42DDO	60 KVA Generator, IDG	X	X	X
69	42DEO	Generator Control Unit	X	X	X
70	42FBO	Electrical Control Panel	X	X	X
71	42HBO	APU/External Power Control Unit	X	X[21]	X
72	42DJO	AC Crosstie Relay	X	X	X
73	42EAO	60 HZ Converter	X	X[22]	X
74	42ABO	Transformer/Rectifier	X	X[23]	X
75	42BAO	NICAD Battery	X	X	X
76	42GBO	Static Inverter	X	X	X
77	42AAI	DC Bus #1, #2, #3, & #4	X	X	X
78	42AAI	DC Avionics Bus #2 & #3	X	X	X
79	42DAI	Generator Bus #1, #2, #3, #4	X	X	X

80	42DAI	115VAC AC Bus 1, 2, 3, 4	X	X	X
81	42DAI	AC Avionics Bus #2 & #3	X	X	X
82	42GAI	115VAC Emergency Bus	X	X	X
83	42GAI	28VDC Emergency Bus	X	X	X
84	42GAI	AC Transfer Bus	X	X	X
85	42GAI	DC Transfer Bus	X	X	X
86	42ABI	Battery Bus	X	X	X
87	42ABI	Battery Direct Bus	X	X	X
88	44000	Lights, Exterior	X	X[26]	
89	44XAO	Cargo Compartment Fluorescent Light	X	X[24]	X[24]
90	44XBO	Cargo Compartment Incandescent Lamp	X	X[25]	X[25]
91	44CAO	Nose Landing/Taxi Lights	X	X[28]	X[28]
92	44CAO	Taxi Lights	X		
93	44CEO	Non-retractable Fuselage Taxi Light	X	X[27]	X[27]
94	44AAO	Forward Position Wing Tip Light	X	X[29]	X[29]
95	44ABO	Aft Position Wing Tip Light	X	X[29]	X[29]
96	44EEO	Upper and Lower Beacon Light	X	X[30]	X[30]
97	44SSF	Emergency Incandescent Lamps	X	X	X
98	45000	Hydraulic Systems	X	X	X
99	45GAO	Hydraulic Systems Controller	X	X[31]	X[31]
100	45ACO	Hydraulic System Reservoir Assembly	X	X	X
101	45CAO	AC Motor Driven Hydraulic Pump	X		
102	45EAO	Reversible Motor Hydraulic Pump	X		
103	45FAA	Emergency Power Unit Ram Air Turbine	X	X	X
104	46000	Fuel System	X		
105	46JCO	Primary Climb and Dive Valve Assembly	X	X	X
106	46FAB	Transfer/Dump Submerged Fuel Pump	X	X[32]	X[32]
107	46CFA	Ground Refueling Control Panel	X	X	X
108	46EAB	Fuel Boost Submerged Pump	X	X[33]	X[33]
109	46EBA	Fuel System/Engine Start Control Panel	X	X	X
110	46EAQ	Crossfeed Valve Assembly	X	X[34]	X[34]
111	46QES	Fuel Quantity Liquid Level Gage Rod (Dipstick)	X	X[35]	X[35]
112	46QAC	Fuel Quantity Display, Tanks 1, 2, 3, 4	X	X[36]	X[36]
113	46QEC	Fuel Quantity Computer	X	X[37]	X[37]
114	47000	Oxygen System	X	X	X
115	47ACC	Quick Don Oxygen Crew Mask	X	X[38]	X[38]
116	47ACE	Panel Mounted Diluter Demand Oxygen Regulators	X	X[38]	X[38]
117	47ABS	Liquid Oxygen Quantity Indicator	X	X	X
118	47FAO	Liquid Oxygen Auxiliary Converter	X	X	X
119	47BAO	Portable Oxygen Cylinder and Regulator	X	X[38(a)]	X[38(a)]
120	47BBO	Quick Don Portable Oxygen Crew Mask (Cargo Compart)	X	X[39]	X[39]
121	49AJO	Engine Fire Detector Controller	X	X40	X
122	49AND	Accessory Compartment Fire Detection Assembly	X	X40	X

123	49APO	Core Compartment Fire Detection Assembly	X	X[40]	X
124	49JAO	Cargo Comp. FWD LM Station Smoke Detector Panel Ind.	X	X[41]	X
125	49FGO	Crew Rest Opaque Particle Sensor	X		
126	49HGO	Underfloor Opaque Particle Sensor	X	X	X
127	49NHO	LWR Avionics Rack IRU Opaque Particle Sensor	X	X[42]	X
128	49NJO	IRU Rack Opaque Particle Sensor	X	X	X
129	49EAO	Vaporizing Liquid Engine Fire Extinguisher	X	X	X
130	51000	Instruments	X		
131	51AAO	Bearing Distance Heading Indicator (BDHI)	X	X[42]	X
132	51EAO	Standby Magnetic Compass	X	X	X
133	51BAO	Standby Attitude Indicator	X	X[43]	X
134	51CMO	Altimeter-Airspeed Indicator	X	X	X
135	51KAO	Engine Standby Thrust Rating Panel Display	X	X	X
136	51300	TCAS Antenna	X	X[62]	X
137	51300	TCAS Processor	X	X[62]	X
138	55EFO	Control Column Shaker Motor	X	X[45]	X
139	55ECO	Angle of Attack Transmitter	X	X[46]	X
140	55DAO	Signal Acquisition Unit (SAU)	X	X[47]	X
141	55DBO	Crash Survivable Memory Unit Recorder	X	X[47]	X
142	55DJO	Sonar Acoustic Underwater Beacon	X	X[48]	X[48]
143	55BAO	Signal Data Recorder	X	X[47]	X
144	55EAO	Propulsion Computer	X	X[49]	X
145	55JAO	Signals Interface Sensor	X	X	X
146	57000	Navigation System	X	X	X
147	57ACO	Flight Control Computer	X	X	X
148	57APO	Rudder Pedal Force Transducer	X	X	X
149	57ADO	Flight Control System Actuator Panel (FCS AP)	X	X	X
150	57AFO	Automatic Flight Control System Actuator Panel (AFCS AP)	X	X	X
151	57AQO	Autopilot Disengage Switch	X	X[44]	X
152	57CKO	Multifunction Control Panel (MFC)	X	X	X
153	57CCO	Multifunction Display Unit (MFD)	X	X[50]	X
154	57EEO	Pitot Static Probe	X	X	X
155	57EAO	Air Data Computer	X	X	X
156	57EFO	Total Air Temperature Probe	X	X	X
157	57KCO	Head Up Display Unit	X	X[51]	X
158	57GAO	Inertial Reference Unit (IRU)	X	X	X
159	57GCO	IRU Power Supply Battery Unit	X	X	X
160	57MBO	Core Integrated Processor Computer (CIP)	X	X	X
161	57MGO	Mission Computer Display	X	X[52]	X
162	57MJO	Mission Computer Keyboard	X	X	X
163	61APO	HF Receiver/Transmitter	X	X[53]	X
164	62AGO	VHF Receiver/Transmitter	X	X	X
165	62ADO	Signal Data Converter	X	X[54]	X

166	63000	UHF Communications	X		
167	63AFO	Communication Switching Panel	X	X[55]	X
168	63ANO	UHF Communications Receiver/Transmitter	X	X	X
169	63***	UHF/VHF/HF Radios	X	X[56]	X
170	64000	Intercom Group/Interphone System	X		X
171	64DEO	Public Address Control	X	X[57]	X
172	64DCO	Audio Frequency Amplifier	X	X[57(a)]	X
173	64DAO	Public Address Loudspeaker	X	X[58]	X
174	64GOO	Surecomm System Wireless Radio Receiver/Transmitter	X		X
175	64AAO	Intercom Set Control	X	X[59]	X
176	64AFO	Intercomm Station	X	X[60]	X
177	65000	IFF/SIF System	X		
178	65ACO	IFF Transponder	X	X[61]	X
179	66AAO	Emergency Locator Radio Beacon	X	X	X
180	66ACO	Emergency Locator Transmitter Antenna	X	X	X
181	68000	Digital Air Data Recorder	X	X	X
182	68AOO	INMARSAT Aero-I Antenna	X	X[62]	X
183	68AOO	INMARSAT Aero-I Control Panel	X	X[62]	X
184	68AOO	Satellite (SRT-2000) Receiver/Transmitter	X	X[62]	X
185	68AOO	Communication Management Unit	X	X[62]	X
186	68AOO	Aircraft Personality Module	X	X[62]	X
187	69BAO	UHF/VHF ARC-210 Receiver/Transmitter	X	X[63]	X
188	69BCO	UHF ARC-210 Radio Set Control Panel	X	X	X
189	69EAO	Cockpit Voice Recording Set Control	X	X	X
190	69ECO	Cockpit Voice Sound Recorder	X	X	X
191	69EDO	Underwater Acoustic Beacon	X	X[48]	X
192	69AAO	Communications/Navigation Equipment Control	X	X[64]	X
193	69ABO	Communications Control	X	X[64]	X
194	69CAO	Central Aural Warning (CAWS) Computer	X	X	X
195	69DCO	Master Warning and Reset Light Assy Switch	X	X[42]	X
196	69DDO	Master Caution and Reset Light Assy Switch	X	X[42]	X
197	69DAO	Warning and Caution Computer	X	X	X
198	69DBO	Warning and Caution Annunciator Panel	X	X	X
199	71PGO	Precision Landing System Receiver	X	X[65]	X
200	71CAO	Distance Measuring Equipment Receiver/Transmitter	X	X[66]	X
201	71AAO	GPS Antenna	X	X[67]	X
202	71ACO	GPS Antenna Electronics Unit	X	X[67]	X
203	72000	Low Range Radio Altimeter	X		
204	72AGO	Weather Radar Receiver/Transmitter	X	X[68]	X
205	72CCO	Altimeter Radar Transceiver	X	X[69]	X

NOTES:

1. (a) Must not be failed in engaged position (w/o clutch capability. (b) Required if flight phase planned or remaining is 12 hours or more. (c) AP must not be used or planned to be used.

2. Seat with inoperable inertia reel assembly must be unoccupied during takeoff and landing.

3. Required only if MFD(s) is (are) inoperative.

4. Pallet/Platform at position with inop sidewall control panel shall be secured with tie-down chains.

5. Not required for Ferry or Flight Test if door can be secured closed.

6. Seal may be damaged if pressurization can be maintained.

7. (a) Uplock cylinder is not required if door is not to be opened. (b) Required if ballast or cargo is carried.

8. (a) Cargo door must be operational. (b) Required if ballast or cargo is carried.

9. (a) Must not be failed in the engaged position. (b) Required if flight phase remaining is 12 hours or more - if inop, auto-throttle system must be placarded.

10. (a) Short/austere operations may not be initiated without an APU. If APU fails to start after landing, do not shut down all engines unless ground power availability exists. (b) APU required for engine start if ground power and air is not available. APU required for deployment location that does not have ground power and air.

11. Item has primary and secondary channels. One channel of one EEC per Aircraft may be inoperative.

12. One of two must operate.

13. Item has two outputs, one output on one engine may be inoperative.

14. Only one igniter per engine is required.

15. Thrust reversers with inoperative thrust reverser control valves must be locked out in symmetrical pairs. Fully operational actuation system required on all operating reversers.

16. (a) Differential pressure indicator not required if cabin altitude indicator and rate of change indicator are operative. (b) Both required for precision landing and/or wind shear testing.

17. Comply with directive for unpressurized flight mission.

18. Not required in non-icing conditions.

19. Not required if windshield ice protection is operative.

20. Use manual wrenching feature if auto function fails.

21. Austere operations may not be initiated without an APU generator. If APU fails to engage after landing, do not shut down all engines unless ground power availability exists.

22. Required for Flight Test data system power.

23. Short austere airfield operations, 3 of 4 must be operational.

24. Every other light must be operational. Two lamps per fixture.

25. Minimum 17 red and white lights must be operative.

26. Mission specific requirements dictate lights required to be operational.

27. (a) Required for short/austere airfield taxi. (b) If associated nose taxi lights are operative, the side light is not required. (c) Not required for day operations.

28. Required if wing tip landing/taxi lights are inop.

29. One lamp per assembly must operate.

30. (a) One lamp on each unit (either red or white) must be operable. (b) Lower beacon not required for short/ austere airfield landing.

31. If no load required, only one required.

32. (a) For quantity greater than 36,000 pounds in tanks #2 and #3 transfer pumps must be operative. (b) One per wing operative, tank with inoperative pump must have one boost pump and all crossfeed valves must be operational.

33. (a) One may be inop per tank with associated transfer pump and crossfeed valve operating normally.

(b) One tank per wing may have inoperative pump.

34. Both boost pumps in associated tank must be operative to fly with inoperative crossfeed.

35. Required if total fuel indicator or fuel quantity displays (one or more digital displays) are inoperative.

36. Required if total fuel indicator is inoperative and dipstick is not available.

37. Either channel A or channel B must be operative.

38. (a) Must be operable at each occupied station. (b) Minimum 4 (P, CP, FTE, & LM).

39. Required for on-board passengers.

40. Only one loop A or loop B light/detector assembly for one engine may be inoperative.

41. Overhead smoke detector panel must be operational.

42. Only one is required.

43. (a) Pilots attitude indicator must be operative. (b) Pilots flying air refueling/IMC must have operative indicator in case of breakaway.

44. Required for air refueling.

45. Not required for high alpha flight test.

46. If less than 5 transmitters are available, turn off ALS and restrict the flight envelope. With ALS off, APDMC needs pair of designated AOA sensors - either 1L and 6R or 5L and 2R.

47. Not required if flight test telemetry is available.

48. Only required for over water missions.

49. Both required for takeoff.

50. (a) If MFD-1 is inop, then HUD-1, MFD-2, and MFD-3 must be operable (good). (b) If MFD-2 is inop, then HUD-1, MFD-1, and MFD-3 must be good. (c) If MFD-3 is inop, then HUD-2, MFD-2, and MFD-4 must be good. (d) If MFD-4 is inop, then HUD-2, MFD-2, and MFD-3 must be good

51. (a) If HUD-1 is bad, then MFD-1, 2, & 3 must be operative. If HUD-2 is bad, then MFD-2, 3, & 4 must be operative. (b) Both required for precision landing and/or wind shear testing.

52. Only three required.

53. (a) Required if mission requires HF communication. (b) All corresponding HF equipment (Coupler, Antenna, Converter, etc.) must be operative for each required Receiver/Transmitter.

54. (a) All corresponding VHF equipment (Antenna, Converter, etc.) required for each required Receiver/Trans.

(b) One required if no UHF operative or if UHF is not available to other communication agencies.

55. Required for air refueling only.

56. Mission specific requirements dictate radios required to be operational.

57. (a) None required if both crew and cordless headsets are operative and no passengers on board. (b) One in flight station and one in cargo compartment required.

58. (a) None required if both crew and cordless headsets operative and no passengers on board. (b) For PAX no three adjacent speakers may be inoperative

59. All primary crew positions must be operative.

60. (a) Minimum crew positions required is four. (b) Oxygen mask microphone must be operative. (c) Pilot and Co-pilot panel required for future air navigation system (FANS) flight plan.

61. (a) Modes 3 and C required for peacetime, Mode 1, 2, and 4 required for wartime. (b) As specified in FAR Part 91, paragraph 91.215.

62. Required if flying a FANS flight plan, otherwise not required.

63. One of two required to be operative. (b) All corresponding equipment must be operative.

64. Only one required, one CNC can control everything for local flights.

65. (a) One VOR/LOC and one glideslope receiver for IMC flying conditions. (b) Two VOR/LOC and two glide slope receivers required for Cat II, not required for VFR approach.

66. (a) One required for approach using DME. (b) FAR Part 91, para 91.205 (E). DME required above 24,000 feet if VOR. NAVAIDS will be required for enroute navigation.

67. Both required only if full navigation system capability required.

68. Required only if flight planned into known or forecast thunderstorm activity.

69. Pilot performing maneuvers must have operative system or operative avionics switching function.

Attachment 26 (Added)

NC/C-130E/H/H2/H3 MINIMUM ESSENTIAL SUBSYTEMS LIST

NC/C-130E/H/H2/H3 Minimum Essential Subsystems List (MESL)				BSL	
NO.	**WUC**	**SYSTEM/SUBSYSTEM**	**FSL**	**DTE**	**DTS**
1	11000	Airframe	X	X	X
2	11***	Crew Door	X	X	X
3	11***	Crew Door Warning Light	X	X	X
4	11***	Paratroop Door	X	X[1]	X
5	11***	Ramp and Ramp Locking System	X	X[2]	X
6	11***	Aft Cargo Door and Locking System	X	X[2]	X
7	11***	Fuselage	X	X	X
8	11***	Wings and Nacelles	X	X	X
9	11***	Empennage	X	X	X
10	12500	Aft Cargo Compartment	X	X[2]	X
11	13000	Landing Gear	X	X	X
12	13***	Landing Gear Position Indicators	X	X	X
13	13***	Landing Gear Warning Light	X	X	X
14	13***	Brakes	X	X	X
15	13***	Wheel Brakes	X	X	X
16	13***	Anti-Skid	X	X	X
17	13***	Parking Brake	X	X	X
18	14000	Flight Controls	X	X	X
19	14***	Control Surface Position Indicator	X	X	X
20	22000	Turboprop Powerplants	X	X	X
21	22***	Torquemeter	X	X	X
22	22***	Tachometer	X	X	X
23	22***	Turbine Inlet Temperature Indicators	X	X	X
24	22***	Fuel Flow Gauges	X	X	X
25	22***	Oil Temperature Gauges	X	X	X
26	22***	Oil Pressure Gauges	X	X	X
27	22***	Oil Quantity Gauges	X	X[3]	X
28	22***	Low Oil Quantity Light	X	X[4]	X
29	22***	Oil Cooler Flap	X	X[5]	X
30	22***	Auxiliary Power Unit	X	X[6]	X
31	24000	Gas Turbine Compressor	X		
32	24***	Air Turbine Motor (ATM)	X	X	X
33	24***	Cooling Fan	X	X	X
34	32000	Hydro Propellers	X	X[7]	X
35	32***	Synchrophaser	X	X	X
36	41000	Air Conditioning/Pressurization	X	X[8]	X
37	41***	AC-Flt Compartment	X	X[8]	X

38	41***	Flight Deck Auxiliary Vent Valve	X	X	X
39	41***	Flight Deck Temperature Control System	X	X[9]	X
40	41***	AC-Cargo Compartment	X	X[8]	X
41	41***	Cargo Compartment Auxiliary Vent Valve	X	X	X
42	41***	Cargo Compartment /Temp Control System	X	X[9]	X
43	41***	Under Floor Heat System	X		X
44	41***	Cabin Pressure Controller	X	X[10]	X
45	41***	Emergency Depressurization Switch	X	X	X
46	41***	Bleed Air System	X	X	X
47	41***	Anti-Ice/De-Ice Systems	X	X	X
48	41***	Ice Detection System	X	X[11]	X
49	41***	Pitot Heat System	X	X	X
50	41***	TAS Probe Heat	X	X	X
51	41***	Wing/Empennage Anti-Icing System	X	X[11]	X
52	41***	Engine Inlet Air Duct Anti-Icing Systems	X	X[11]	X
53	41***	Leading Edge Temperature Indicators	X	X	X
54	41***	Wing Leading Edge and Wheel Well Overtemperature Warning Lights	X	X	X
55	41***	Propeller Anti-Icing System	X	X[11]	X
56	41***	Windshield Anti-Icing Systems	X	X[11]	X
57	41***	Radome Anti-Icing System	X	X[12]	X
58	41***	Instruments	X	X	X
59	41***	Cabin Altimeter	X	X[10c]	X
60	41***	Cabin Differential Pressure Indicator	X	X[10c]	X
61	41***	Cabin Rate-of-Climb Indicator	X	X[10c]	X
62	42000	Electrical Power Supply	X	X	X
63	42***	Engine-Driven Generators	X	X	X
64	42***	Bus Switching System (BSS)	X		X
65	42***	Bus Switching Unit (BSU)	X	X[13]	X
66	42***	Transformer/Rectifiers (TR)	X	X[14]	X
67	42***	ATM/APU Generator	X	X[6]	X
68	42***	Generator Out Lights	X	X[15]	X
69	42***	AC Load Meter	X	X[15]	X
70	44000	Navigation Lights	X	X1[6]	X1[6]
71	44***	Landing Lights	X	X[18]	X[18]
72	44***	Taxi Lights	X	X[19]	X[19]
73	44***	Wing Leading Edge Lights	X		
74	44***	Formation Lights	X	X[17]	X[17]
75	44***	Strobe (Anti-Collision) Light System	X	X	X
76	44***	Pedestal/Pilots Side Panel Lights	X	X[20]	X[20]
77	44***	Panel Lights	X	X[20]	X[20]
78	44***	Warning Lights	X	X[20]	X[20]
79	44***	Emergency Exit Lights	X	X	X

80	45000	Hydraulic and Pneumatic Power Supply	X	X	X
81	45***	Engine Driven Hydraulic Pumps	X	X	X
82	45***	Utility/Booster System Engine Pump Pressure Warning Lights	X	X	X
83	45***	Utility System Hydraulic Pressure Indicator	X	X	X
84	45***	Booster System Hydraulic Pressure Indicator	X	X	X
85	45***	Hydraulic Suction Boost Pump	X	X	X
86	45***	Auxiliary Hydraulic Pump	X	X	X
87	45***	Auxiliary Hydraulic Pressure Indicator	X	X	X
88	45***	Rudder Boost Pressure Indicator	X	X[21]	X
89	46000	UARRSI	X		
90	46000	Fuel Tanks	X	X	X
91	46***	SPR Dual Level Control	X	X	X
92	46***	Fuel System Instruments	X	X	X
93	46***	Main Tank Fuel Pumps	X	X	X
94	46***	Main Tank Dump Pumps	X	X	X
95	46***	Auxiliary Tank Fuel Pumps	X		X
96	46***	External Tank Fuel Pumps	X	X[22]	X
97	46***	Main Fuel Quantity Indicators	X	X[23]	X
98	46***	Auxiliary Tank Fuel Quantity Indicators	X		X
99	47000	Oxygen System	X	X[1]	X
100	49000	Miscellaneous Utilities	X	X[1]	
101	49***	Engine Fire/Turbine Overheat Warning Sys	X	X	X
102	49***	Nacelle Overheat Systems	X	X	X
103	49***	GTC/APU Fire Warning System	X	X	X
104	49***	Windshield Wipers	X		X
105	49***	Personnel Warning Bell	X		X
106	51***	Sextant	X		
107	51***	Pitot Static System	X	X	X
108	51***	Turn and Slip Indicating System	X	X	X
109	51***	Attitude Director Indicating System	X	X	X
110	51***	Standby ADI	X	X	X
111	51***	Navigation Instruments	X	X	X
112	51***	TCAS	X	X[25]	X
113	51***	Flight Director System	X	X	X
114	51***	Horizontal Situation Indicators	X	X	X
115	51***	Standby Magnetic Compass	X	X	X
116	51***	EFI Displays	X	X	X
117	51***	BDHI	X		
118	51***	Barometric Altimeters	X	X[24]	X
119	51***	Heading Systems	X	X[25]	X
120	51***	GPWS	X	X[25]	X
121	51***	GCAS	X	X[25]	X

122	51***	Central Air Data Computer	X	X	X
123	51***	Nav Selector Panel	X	X	X
124	51***	Airspeed Indicator	X	X	X
125	51***	Vertical Velocity Indicator	X	X[30]	X
126	51***	NDB	X	X	X
127	52200	N-1 Compass System	X		
128	56A00	Cockpit Voice Recorder	X	X	X
129	56B00	Flight Data Recorder	X	X	X
130	61500	HF	X	X[1]	
131	61600	ANDVT	X		
132	62X00	VHF	X	X[1]	X
133	63M00	UHF	X	X[1]	X
134	63***	#1 UHF Manual Control Head Radio (SCNS Only)	X	X	X
135	64200	Intercom System	X		
136	65000	IFF/SIF	X	X[1]	X
137	66000	Emergency Communications	X	X	X
138	66***	Emergency Locator Transmitter	X	X	X
139	66300	Underwater Acoustic Locator System	X	X	X
140	69210	Radio Direction Finder	X		X
141	69600	KY-58 Secure Voice	X		
142	71C00	VOR	X	X	X
143	71F00	Global Positioning System	X	X	X
144	71GA0	IDCO	X	X[26]	X
145	71GB0	BICU	X	X	X
146	71GEO	RLG INU	X	X	X
147	71J00	Microwave Landing System	X	X[27]	
148	71***	Instrument Landing System	X	X[27]	X
149	71Z00	TACAN (AN/ARN-118)	X	X	X
150	71100	Radio Compass	X	X	X
151	72100	Doppler Velocity Sensor	X	X[27]	X
152	72170	CARA	X	X[25]	X
153	72320	Waveguide Pressurization System	X	X	X
154	72***	Search Radar	X	X[1]	X
155	72***	Radar	X	X[28]	X
156	72***	Weather Radar	X	X[29]	X
157	76A00	Flare/Chaff Dispenser (AN/ALE-40)	X		
158	76J00	Missile Warning (AN/AAR-47)	X		
159	76N00	Flare/Chaff Dispenser (AN/ALE-47)	X		
160	97A00	Fire Extinguisher System	X	X	X
161	91113	Escape Rope	X		X
162	91213	Life Raft	X		X

NOTES:

1. Test dependent. As determined by test director based on mission objectives.

2. Warning light, latching mechanisms, and locking system must be operational for pressurized flight.

3. One oil quantity gauge can be inoperative provided the oil quantity is verified prior to flight and the low oil quantity light is operational.

4. If inoperative, all four oil quantity gauges must be operational.

5. Oil cooler flaps may be inoperative if the flap can be manually positioned to open and fixed and oil temperature can be maintained within normal limits.

6. If the ATM, ATM generator, or APU fails, flight in visual meteorological conditions (VMC) is authorized provided no other electrical malfunctions exist. If the APU generator is inoperative, the generator will be removed and padded prior to operation of the APU.

7. Propeller may be operated with a feather override failure where the override button fails to pop out at full feather, (faulty pressure switch) provided maintenance instructions in the applicable fault isolation manual are followed and no other system is affected.

8. a. Pressurization and both air conditioning systems must be operational for special weapons mission. b. Pressurization and both air conditioning systems are normally essential if passengers are carried. If a system fails, flight to a destination with repair capability may be accomplished. Passengers will be briefed on the possibility that discomfort may be encountered. c. Air Conditioning and pressurization are not required for low-level missions if a reasonable temperature can be maintained.

9. Automatic system may be inoperative provided manual temperature control can be maintained.

10. a. Automatic controller may be inoperative for pressurized flight provided the manual controller is operative. b. May be inoperative for unpressurized flight.

11. Blade de-icing will be operational for flight into known or forecast icing conditions.

12. May be inoperative for flights that do not require radar.

13. The #1 BSU must be operational.

14. One essential TR unit may be inoperative for flight to a repair facility provided no other electrical malfunctions exist.

15. All associated equipment and indicators will be operational for each operative engine-driven generator (i.e., generator control panel, GCU, voltage regulator, generator out/caution light, AC loadmeter, etc)

16. For night operations, the left and right wingtip navigation lights must be operational in addition to one of the white lights on the tail cone.

17. Not required for daylight operations. Two lights per wing will be operational for night formation flights

18. One may be inoperative provided the taxi light on the same side is operational.

19. One may be inoperative provided the landing light on the same side is operational.

20. All edge "peanut" lighting or backlit lighting will be operational for night operations for the following instruments; airspeed, altimeters, VVI/VSI, ADI, and HSI.

21. One may be inoperative.

22. One per tank required if tank contains fuel.

23. One main fuel tank indicator may be inoperative provided: a. Both the tank with the inoperative indicator and its symmetrical tank quantity are verified by use of a fuel tank dipstick. b. At enroute stops when engines are shut down, the tank with the inoperative indicator and the symmetrically opposite tank will be dip checked. c. Crossfeed operation will begin when the symmetrically opposite quantity indicator has decreased to 1,500 lbs (inboards) and 2,500 lbs (outboards). d. Engine-out training using the engine corresponding to the inoperative indicator or its symmetrical opposite will not be conducted during tank to engine operation. e. Flights consisting of multiple stops when the mission profile does not allow dipping of tanks will terminate with a minimum of 8,000 lbs calculated main tank fuel.

24. Both pilot's altimeters must be operational.

25. Always required if carrying passengers.

26. Two are required.

27. If installed, one must be operational.

28. Required if thunderstorms or hazardous conditions that can be detected by airborne radar are forecast or exist along route of flight.

29. If equipped with two radars then not required, pilots radar is all that is required for flight if known or forecast thunderstorms are expected along route of flight or at night.

30. Vertical velocity indication may be inoperative on one indicator except for flights in RVSM airspace

Attachment 27 (Added)

NKC/KC/C-135B/C/E/R MINIMUM ESSENTIAL SUBSYTEMS LIST

NKC/KC/C-135B/C/E/R Minimum Essential Subsystems List (MESL)				BSL	
NO.	**WUC**	**SYSTEM/SUBSYSTEM**	**FSL**	**DTE**	**DTS**
1	11000	Airframe	X	X	X
2	12000	Cockpit and Fuselage Compartments	X	X	X
3	13000	Landing Gear	X	X	X
4	13***	Landing Gear Position Indicators	X	X	X
5	13***	Landing Gear Lock Alignment Stripes	X	X	X
6	13***	Wheel Brakes	X	X	X
7	13***	Anti-Skid System	X	X	X
8	13***	Parking Brake	X	X	X
9	13***	Landing Gear Handle Warning Light	X	X	X
10	14000	Flight Controls	X	X	X
11	14***	Warning Horn and Cutout Switch	X	X	X
12	14***	Stabilizer Trim Control Switches	X	X[6]	X
13	14***	Electric Trim Motor	X	X	X
14	14***	Power Rudder System	X	X	X
15	14***	Flap Position Indicators	X	X[7]	X
16	14***	Spoiler Systems	X	X	X
17	14***	Yaw Damper	X	X[8]	X
18	14***	Yaw Damper Off Light	X		
19	14***	EFAS	X	X	X
20	14***	SYD	X	X	X
21	14***	Emergency System	X	X	X
22	14***	Disengage Button	X		
23	23000	Turbofan Propulsion System	X	X	X
24	23***	Thrust Reversers	X		
25	23***	Thrust Reverser Lights	X		X
26	23***	Engine Ignition (A/B)	X	X[1]	X
27	23***	EPR Gauges	X	X	X
28	23***	Tachometer (N2)	X	X	X
29	23***	EGT Gauges	X	X	X
30	23***	Engine Fuel Flow Meter	X	X[2]	X
31	23***	Oil Pressure, Temperature, and Quantity Gauges	X	X	X
32	23***	Engine Low Oil Pressure Warning Lights	X	X	X
33	23***	Engine Oil Filter Warning Lights	X	X	X
34	23***	Engine Fire Detector System (All Engines)	X	X	X
35	23***	Engine Fire and Overheat Detection and Extinguishing	X	X	X
36	23***	PMC	X	X[3]	X_3
37	23***	Auxiliary Power Unit (APU)	X	4	X

38	23***	Anti-Ice System	X	X	X
39	23***	N1 Indicator Gauge	X	X	X
40	23***	N2 Tach Indicator	X	X	X
41	41000	Air Conditioning, Pressurization, and Bleed Air System	X	X	X
42	41***	Air Conditioning Temperature Control Sys	X	X[10]	X
43	41***	Cabin Pressure Control	X	X[9]	X
44	41***	Cabin Pressure Warning Light	X		
45	41***	Cabin Altitude Gauge	X	X	X
46	41***	Bleed Valves	X	X[11]	X
47	41***	Bleed Air System Caution Lights	X	X	X
48	41***	Vapor Cycle Units & Control	X		
49	41***	Wing Anti-Ice	X		
50	41***	Windshield Wiper System	X		
51	41***	Window Anti-Ice System	X	X	X
52	41***	Boom Operator Heated Window	X	20	X
53	41***	Q Inlet Heat	X	X	X
54	42000	Electrical System	X	X	X
55	42***	AC Generator	X	21	X
56	42***	AC Generator Bus	X	X	X
57	42***	Copilot Instrument Power	X		
58	42***	Bus Tie Breaker Light	X	X	X
59	42***	Bus Subsystem Interface Unit (BSIU)	X	X	X
60	42***	Generator Breaker Circuit Open Light	X	X	X
61	42***	Generator Failure Light	X	X	X
62	42***	Generator Drive Oil Temperature Rise Gauge	X	X	X
63	42***	Generator Drive Oil Pressure Warning Light	X	X	X
64	42***	Generator Auto Parallel	X		
65	42***	Generator Power Meter KW/KVAR	X	X	X
66	42***	Synchronizing Lights	X	X	X
67	42***	Battery Charging Ammeter	X	X	X
68	42***	Transformer Rectifiers	X	X	X
69	42***	DC Load Meter	X	X	X
70	42***	DC Power Selector Ammeter Voltmeter Switch	X	X	X
71	42***	Selector Paralleling Voltmeter Frequency Meter & Synchronizing Switch	X	X	X
72	42***	Battery	X	X	X
73	42***	Bus Tie Breaker Circuit Open Light	X	X	X
74	42***	Generator Control Breaker Circuit Open Caution Light	X	X	X
75	42***	IDG Fail Caution Light	X	X	X
76	42***	IDG Disconnect Light	X	X	X
77	42***	Generator Control Unit	X	X	X
78	42***	Battery Load Meter	X	X	X
79	42***	AC Volt Meter	X	X	X

80	42***	AC Ammeter	X	X	X
81	42***	DC Volt Meter	X	X	X
82	42***	Frequency Meter	X	X	X
83	42***	Switched DC Bus	X	X	X
84	44000	Lights, Exterior	X		X
85	44***	Position Lights	X	X[23]	X
86	44***	Strobe Lights	X	X[24]	X
87	44***	Landing Lights	X	X[24]	X
88	44***	Taxi Lights	X	X[25]	X
89	44***	Light, Interior	X	X	X
90	44***	Door Warning Lights	X	26	X
91	44***	Overhead Panel Caution Light	X		
92	45000	Hydraulic Systems	X	X	X
93	45***	Hydraulic Pumps	X	X	X
94	45***	Auxiliary Pumps	X	X[5]	X
95	45***	Hydraulic Quantity Gauge	X	X	X
96	45***	Hydraulic Systems Pressure Gauges	X	X	X
97	45***	Copilot Instrument Power Hydraulic Motor	X	X	X
98	45***	Hydraulic Pump Inop Caution Lights	X	X	X
99	46000	Fuel System	X	X	X
100	46***	Boost Pumps	X	X	X
101	46***	Override Pumps	X	X	X
102	46***	Tank to Engine Manifold Valves	X	X[12]	X
103	46***	Air Refueling	X		X
104	46***	Air Refueling Manifold to Engine Manifold Valve	X	X	X
105	46***	Center Wing to Forward Body Tank (Drain) Valves	X		X
106	46***	Reserve Tank (Drain) Valves	X	13	X
107	46***	Upper Deck (Drain) Valve	X		
108	46***	Fuel Dump	X	X	X
109	46***	Wing Aft Body Tank Valves	X	X	X
110	46***	Air Refueling Line Valve	X		
111	46***	Air Refueling Pumps	X	14	X
112	46***	Air Refueling Pump Automatic Shutoff Sys	X		
113	46***	Boom Sighting Door	X	X	X
114	46***	Boom Azimuth Indicator	X	X	X
115	46***	Boom Elevation Indicator	X	X	X
116	46***	Boom Signal Coil	X	X	X
117	46***	Boom Signal Amplifier	X		X
118	46***	Air Refueling Flood Light	X		X
119	46***	Air Refueling Nozzle Light	X		
120	46***	Engine Manifold Fuel Low Pressure Warning Lights	X	X	X
121	46***	Fuel Temperature Gauge	X		
122	46***	Total Fuel Quantity	X		X

123	46***	Offload Fuel Flow Rate and Totalizer Gauge (w/o TCTO1131)	X		
124	46***	Main Tanks	X	X	X
125	46***	Center Wing Tank	X	X	X
126	46***	Reserve Tank	X		
127	46***	Forward Body Tank	X	X	X
128	46***	Aft Body Tank	X	X	X
129	46***	Upper Deck Tank	X		
130	46***	IFMP	X	X	X
131	46***	CG Indicator (w/TCTO 1131)	X		
132	46***	Fuel Transfer Quantity Display	X		
133	46***	Fuel Transfer Rate Display (w/TCTO 1131)	X		
134	47000	Oxygen System	X	X[17]	X
135	47***	Portable Oxygen Bottles	X	18	X
136	47***	Oxygen Regulators	X	19	X
137	49***	Fire Detection & Control	X	X	X
138	51000	Instruments	X	X	X
139	51***	Stall Warning System	X	X	X
140	51***	Digital Flight Recorder	X	X	X
141	51***	MACH Indicators	X		X
142	51***	True Airspeed Indicator	X		X
143	51***	Indicated Airspeed Indicators	X	X	X
144	51***	Vertical Velocity Indicators	X		X
145	51***	Barometric Altimeters	X	16	X
146	51***	Radio Altimeters	X		X
147	51***	Pitot Static and Heat System	X	X	X
148	51***	Outside Air Temperature Gauge	X		
149	51***	Total Air Temp System	X	X	
150	51***	Comparator Warning System	X		
151	51***	Angle of Attack	X		X
152	51***	Angle of Attack Transmitter Anti-Ice	X		X
153	51***	Accelerometer	X		
154	51***	Attitude and Direction Indicator	X	X	X
155	51***	Flight Director/Rotation Go-Around System (FD/RGA)	X		X
156	51***	Ground Proximity Warning System	X	X	X
157	51***	MFDs	X	X[27]	X
158	51***	MFD Control Panel	X	X[28]	X
159	52000	Autopilot	X		X
160	52***	Disengage Button	X		
161	52***	Indicator, 3 Axis Trim	X	X	
162	52***	Yaw Control and Yaw Damper System	X	X	X
163	57000	Inertial Navigation System	X	X	X
164	57***	Data System	X	X	X
165	57***	Data Loader (DLDR)	X	X	X

166	57***	Magnetic Compass	X	15	X
167	57***	N-1 Compass	X	X	X
168	57***	J-4 Compass	X	X	X
169	57***	DNS	X		
170	57***	Instrument Landing System	X		
171	57***	RMI	X	15	X
172	57***	APN-59 Radar	X		
173	57***	Repeater Scope	X		
174	57***	APN-69/APN-134 Beacon	X		
175	57***	APN-218	X		
176	57***	ASQ-15 Radar Pressure	X		
177	57***	Electronic Cabinet Cooling	X	X	X
178	57***	Electronic Cabinet Cooling Overheat Light	X		
179	57***	Sextant	X		
180	57***	CDU-900B	X	X	X
181	57***	INS CDU Warning Light	X	X	X
182	57***	DNS CDU Warning Light	X		
183	57***	HSI	X		
184	62000	VHF Communications	X	22	X
185	63000	UHF Communications	X	22	X
186	63***	UHF/VHF/HF Radios	X	22	X
187	64000	Intercom Group/Interphone System	X	X	X
188	64***	Comm Bus System Interface Unit (CBSIU)	X	X	X
189	65000	IFF/SIF System	X		
190	66000	Cockpit Voice Recorder System	X	X	X
191	66B00	Flight Data Recorder	X	X	X
192	68000	Digital Air Data Recorder	X	X	X
193	71000	Radio Navigation (VOR/TACAN)	X	X	X
194	72000	Low Range Radio Altimeter	X		
195	72***	Color Weather Radar System	X		
196	72***	WXR-70OX Radar	X		
197	72***	WCP-701 Radar Control Panel	X		
198	72***	Predictive Wind Shear PWS	X		
199	72***	Global Positioning System	X	X	X
200	72***	Embedded GPS/INS (EGI)	X	X	X
201	72***	GPS	X	29	X
202	72***	INU -1 (EGI)	X	X	X
203	72***	INU-2 (Carousel IV)	X	X	X
204	72***	Radio Transponder System	X		
205	74***	Pacer Crag Associated Equipment	X		
206	74***	IFF/SIF System	X		
207	74***	Vertical Gyro (SBU-23)	X	X	X
208	74***	Standby ADI	X	X	X

209	74***	Synchro Repeaters	X	X	X
210	74***	1553 Data Bus	X	X	X
211	74***	TCAS	X	X	X
212	74***	TCAS VSIs	X	X	X
213	74***	Altitude Alerters	X		
214	91000	Emergency Equipment	X	X	X
215	91***	Emergency Locator Transponder	X	X	X
216	91***	Enhanced Ground Proximity Warning System	X	30	X
217	91***	Emergency Alarm Horn	X	X	X
218	91***	Fire Extinguishers	X		
219	91***	Escape Ropes	X		X
220	96000	Personnel and Miscellaneous Equipment	X		X

NOTES:

1. One igniter per engine must be operable.

2. One may be inoperative provided all other indicators for affected engine are operating normally.

3. (1) Refer to Aircraft Flight Manual, Section 1. (2) Simulated 3-engine approaches and touch and go landings are not authorized with PMC inoperative

4. Ensure engine start capability exists at recovery site.

5. Left auxiliary pump must be operative.

6. The trim switch must operate for the pilot flying during critical phases of flight.

7. One may be inoperative on either flap gauge provided: (1) Flaps operate normally, (2) Verification of flap position can be made prior to take off and landing.

8. Must operate for long range cruise above FL 250.

9. (1) Automatic or manual mode must be operable. (2) Exception: Not required for unpressurized flight, see AFI 11-202, Volume 3 for requirements

10. Automatic or manual mode must be operable.

11. (1) One may be inoperative on takeoff, but "R" model must have repair capability at next destination.

(2) One may inoperative, but on "E" model the failure must fail to the closed position. Consider pressurization and temperature for sustained high altitude cruise.

12. One may be inoperative, but must fail to open position. Pull circuit breaker.

13. Valves not required to be operative if fuel is not needed for flight, and valves are verified closed.

14. (1) All must operate for extended over-water operations. (2) All must operate for gross weights which do not permit an immediate landing under normal flight manual landing parameters

15. Only required if carrying passengers/troops.

16. Navigator's altimeter may be inoperative with no associated pitot static problems.

17. Primary system must be operable, minimum pressure 325 p.s.i.

18. One per primary crew member.

19. Each primary crewmember must have access to an operable regulator during flight.

20. Required for Air Refueling Missions.

21. (1) All must be operative except to avoid delays from airfields where maintenance is not adequate. (2) One time takeoff and flight is permitted with a disconnected generator drive to reach a field where repairs can be made. (3) With an inoperative generator (a) Do not use mission power without first coordinating electrical loads with the mission and flight crew. (b) Total flight and mission electrical loads shall not be allowed to exceed 50% of rated output for the number of generators operating. (c) All remaining generators must be paralleled and supply power to all generator buses.

22. As mission dictates. Comm 1 must operate.

23. Both wing tip lights and one tail light must be operative.

24. At least one must operate.

25. One taxi or terrain light must be operative for night operations.

26. Crew entry door and cargo door must be visually verified secured.

27. The center MFD and one of the pilot's front MFDs can be inoperative, provided PFD mode can be displayed on the remaining pilot's front MFD. MFD 2B must be operational for all flights.

28. Both pilot's MFD CPs must be operational.

29. Initial position and date/time must be manually inserted into EGI.

30. Not required for Test missions. Required 3P or 4P when carrying passengers.

Attachment 28 (Added)

E-8 MINIMUM ESSENTIAL SUBSYTEMS LIST

E-8 Minimum Essential Subsystems List (MESL)				BSL	
NO.	**WUC**	**SYSTEM/SUBSYSTEM**	**FSL**	**DTE**	**DTS**
1	11000	Airframe	X	X	X
2	12000	Cockpit and Fuselage Compartments	X	X	X
3	13000	Landing Gear	X	X	X
4	14000	Flight Controls	X	X	X
5	14M00	Emergency System	X	X	X
6	23000	Turbofan Propulsion System JT3D	X	X	X
7	23LB0	Anti-Ice System	X	X	X
8	23MAC	N1 Tach Indicator	X	X[1]	X[1]
9	23MAD	N2 Tach Indicator	X	X	X
10	23MCB	EPR Indicator	X	X[2]	X[2]
11	24000	Auxiliary Power Plant	X		
12	41000	Air Conditioning, Pressurization, and Surface Ice Control	X	X	X
13	41B00	Air Source Control System	X	X	X
14	41E00	Pressurization Waveguide	X	X	X
15	41F00	Cabin Pressure	X	X	X
16	41FK0	Indicator, Differential Pressure Dual Altimeter	X		
17	41P00	Air Cycle Machine and Control	X	X[3]	X
18	41Q00	Vapor Cycle & Control	X	X	X
19	41S00	Antenna Moisture Control	X		
20	41T00	Liquid Cooling System	X	X	X
21	42000	Electrical Power Supply	X	X	X
22	422A0	Integrated Drive Gearbox	X	X	X
23	42300	DC Power	X	X	X
24	423G0	Transformer-Rectifier, 75 Amp	X	X[4]	X[4]
25	44100	Light, Exterior	X	X[5]	X[5]
26	44200	Light, Interior	X	X[5]	X[5]
27	442EQ	Visual Display Warning Unit	X	X	X
28	442H0	Warning Lights	X	X[6]	X[6]
29	45000	Hydraulic & Pneumatic Power Supply	X	X	X
30	45A00	Utility Hydraulic	X	X[7]	X[7]
31	43B00	Auxiliary Hydraulic	X	X	X
32	46000	Fuel System	X	X	X
33	462F0	Boost Pump	X	X	X
34	462H0	Override Pumps	X	X	X
35	462S0	In-flight Refueling	X	X[8]	X[8]
36	47000	Oxygen System	X	X	X

37	49100	Fire Detection & Control	X	X	X
38	49400	Personnel Warning System	X	X	X
39	51000	Instruments	X	X	X
40	51A00	Stall Warning System	X	X	X
41	51B00	Digital Flight Recorder	X	X[9]	X[9]
42	51C00	Central (MACH) Warning System	X	X	X
43	51D00	Pitot Static System	X	X	X
44	51E00	Total Air Temp System	X	X	X
45	51F00	Air Data System	X	X	X
46	51G00	Attitude and Direction	X	X	X
47	51H00	Attitude and Heading Reference System (AHRS)	X	X	X
48	51J00	Flight Director System	X	X	X
49	51K00	Ground Proximity Warning System	X	X	X
50	52000	Autopilot	X	X	X
51	52DD0	Indicator, 3 Axis Trim	X	X[10]	X
52	52E00	Yaw Control and Yaw Damper System	X	X	X
53	52H00	Mach Trim System	X	X	X
54	57A00	Inertial Navigation System	X	X	X
55	57C00	Data System	X	X	X
56	57E00	Bus System Interface System	X	X[11]	X
57	61B00	HF Communications	X	X	X
58	62B00	VHF Communications	X	X[12]	X[12]
59	63B00	UHF Communications	X	X[13]	X
60	64C00	Intercom Group	X	X	X
61	64CA0	Intercommunication Station (Crew Terminal)	X	X[14]	X
62	64CC0	Intercommunication Station (FSU)	X	X[15]	X
63	64CP0	Comm Bus System Interface Unit (CBSIU)	X	X[11]	X
64	65A00	IFF System	X	X[16]	X[16]
65	66A00	Voice Recorder System	X	X[17]	X[17]
66	69A00	Air Data Terminal Group (SCDL)	X	X	X
67	69B00	JTIDS Radio Set	X	X[18]	X
68	71000	Radio Navigation (VOR/TACAN)	X	X[19]	X[19]
69	71B00	Marker Beacon	X		
70	71C00	ADF System	X		
71	72A00	Low Range Radio Altimeter	X		
72	72B00	Weather Radar System	X	X[20]	X
73	72C00	Global Positioning System	X	X	X
74	72D00	Radio Transponder System	X		X
75	81A00	Antenna Assembly	X	X	X
76	81AA0	Shifter, Phase	X	X[21]	X
77	81AB0	Channel Assy, Receiver	X	X	X
78	81AE0	CCA, Post Regulator	X	X	X
79	81AF0	CCA, Phase Shifter Interface	X	X	X

80	81AQ0	Inertial Measurement Unit	X	X	X
81	81CA0	Amplifier, Radio Frequency (HPC)	X	X[22]	X
82	81CC0	Amplifier, Radio Frequency (XMTR)	X	X[22]	X
83	81CE0	Amplifier-Oscillator (Exciter)	X	X	X
84	81CF0	Amplifier-Modulator (ASE)	X		
85	81CH0	Converter, Analog to Digital (Receiver)	X	X[23]	X
86	81CK0	Converter, Signal Data (PCU)	X	X	X
87	81CL0	Converter, Signal Data (SPP)	X	X	X
88	81CM0	Control, Radar Set (RCU)	X	X	X
89	81CP0	Converter, Signal Processor (PSP)	X	X[24]	X
90	81CQ0	Converter, Data Processor (IMG)	X	X	X
91	81CR0	Radar Bus Couplers & Digital Data Couplers	X	X	X
92	81CS0	Waveguides, Radar	X	X	X
93	82AB0	Computer, Digital (GPC)	X	X[25]	X
94	82AC0	Computer, Digital (SM&C)	X	X[11]	X
95	82AE0	Converter, Signal Data (GPC Expansion)	X	X[25]	X
96	82AF0	Converter, Signal Data (SM&C Expansion)	X	X[11]	X
97	82AH0	Recorder-Reproducer Set, Militarized Disk	X	X[24]	X
98	82AHN	Removable, Transportable Memory Module	X	X[26]	X
99	82AK0	Junction Box, System Test (STP Box)	X	X	X
100	82AL0	Junction Box, Power Interlock (PIC Box)	X	X	X
101	82AN0	Control Panel, Prime Mission Equipment	X	X	X
102	82AT0	Box Assy, SM&C Junction	X	X	X
103	82AW0	Junction Box, Serial Data (SDUSU)	X	X	X
104	82AZ0	Couplers , Data processing and Digital Data	X	X	X
105	82C00	Data Display Subsystem (O&C)	X	X[27]	X
106	82CA0	Data Display Unit	X	X[27]	X
107	82CD0	Operator Workstation Imbedded Disk	X	X[27]	X
108	82CF0	Processor, Digital Display (ADDP)	X	X[27]	X
109	82CH0	Keyboard, Data Entry	X	X[27]	X
110	82CJ0	Removable, Transportable Memory Module	X	X[27]	X
111	91000	Emergency Equipment	X	X	X
112	96000	Personnel and Miscellaneous Equipment	X	X	X

NOTES:

1. PMC when inoperative if associated engine EPR indicator is operable.
2. PMC when inoperative if associated engine N1 indicator is operable.
3. PMC if manual control is operational.
4. PMC if No 2 TR and Essential buses are operational.
5. As directed by AFI 11-202 Vol 3.
6. PMC if PA system and flight deck and mission interphone systems are operable.
7. PMC if corresponding pressure gauge(s) operable.
8. PMC if 1 set of ready, contact, and disconnect lights is operable.
9. PMC if CVR (Cockpit Voice Recorder) is operational.

10. PMC if the rudder axis is operational
11. PMC if one operational.
12. PMC if Flight Deck VHF is operable.
13. PMC if eight UHF mission radios and one Flight Deck radio are operational.
14. PMC if three CMTs are inoperative.
15. PMC if one FSU is operational.
16. PMC if one system is operable.
17. PMC if FDR (Flight Data Recorder) is operational.
18. PMC if one system is operable.
19. PMC if one TACAN or VOR/ILS is operable at each pilot's station.
20. PMC if Navigator's is operable.
21. PMC if two inoperable.
22. PMC if failure allows transmitter configuration to 2.
23. PMC if one operable (must be in #1 position).
24. PMC if three operable.
25. PMC if two operable.
26. PMC if two RTMMs operational (System disk and SDB disk).
27. Must have a minimum of 14 O&C workstations. The NOWS station must be operational.

Attachment 29 (Added)

B-1B MINIMUM ESSENTIAL SUBSYTEMS LIST

B-1B Minimum Essential Subsystems List (MESL)				BSL	
NO.	**WUC**	**SYSTEM/SUBSYSTEM**	**FSL**	**DTE**	**DTS**
1	11000	Airframe	X	X	X
2	12000	Flash Blindness Protection	X		
3	13000	Landing Gear System	X	X	X
4	14000	Flight Control System	X	X	X
5	14HA*	Wing Sweep System	X	X	X
6	16000	Ejection System	X	X	X
7	19000	Engine Starting 1, 2, 3, 4	X	X	X
8	23000	Power Plant	X	X	X
9	24000	APU	X	X[1]	X[1]
10	27000	Accessory Drive Gearboxes (ADGs)	X	X	X
11	39C**	Pitot Static	X	X	X
12	39D**	Window and Windshield Anti-ice Defog	X		
13	39F**	Windshield Rain Repel and Alt Anti-ice Defog	X	X[2]	X[2]
14	41000	Air Conditioning and Pressurization	X	X	X
15	42000	Electric Power Supply	X	X	X
16	43A**	EMUX Primary/Secondary Data Link	X	X	X
17	43B**	Terminals	X	X	X
18	43C**	CITS Interface	X	X	X
19	44AB*	Panel and Instrument Lighting	X	X	X
20	44AC*	Annunciator Lighting	X	X	X
21	44BC*	Aft Station Annunciatior Lighting	X	X	X
22	44D**	Exterior Lighting	X	X[3]	X[3]
23	45000	Hydraulic System	X	X	X
24	46000	Fuel System	X	X	X
25	47000	Oxygen System	X	X	X
26	48C**	Recorder System (not instrumentation)	X	X[8]	X
27	48E**	Central Warning System	X	X	X
28	49000	Fire Protection System	X	X	X
29	51000	Electrical/Electronic Panels & Multipurpose Components	X	X	X
30	52A**	Automatic Flight Control System (AFCS)	X	X	X
31	52BA*	Structural Mode Control System (SMCS)	X	X[4]	X[4]
32	55000	Central Integrated Test System (CITS)	X	X	X
33	59AA*	HF Radio	X		
34	59B**	VHF and UHF Communications	X	X[5]	X[5]
35	59EA*	Interphone System	X	X	X
36	73A**	Navigation, Flight Environment	X	X	X

37	73B**	Navigation, Attitude and Direction	X	X	X
38	73C**	Navigation, Landing and Taxi Aids	X	X	X
39	73DA*	Nav, Independent Position Determination	X	X	X
40	73DB*	Navigation, Doppler Radar	X	X	X
41	73DC*	Navigation, Offensive Radar (ORS)	X	X	X
42	73E**	Nav, Dependent Position Determination	X	X[6]	X[6]
43	73FE*	Avionics Control Unit Complex	X	X[7]	X[7]
44	73FH*	Navigation, Multi-function Displays	X	X	X
45	73W**	Global Positioning System	X	X	X
46	75000	Weapons System	X	X[8]	X[8]
47	76000	ECM Systems (76AAJ,AB,AC, AD,AE,AJ,C,D,G,H)	X	X[9]	X[9]
48	97000	Explosive Devices and Components	X	X	X
49		Special Instrumentation (SI)		X[10]	

NOTES:

1. One fully operational APU required.
2. Must have left and right windshield defog capability.
3. As required by AFI 11-202V3.
4. Required for test/training missions with low level flight (Terrain following or Visual contour).
5. Need one operable UHF or VHF radio, may require both for test mission.
6. Must have IFF.
7. Block D and prior: Must have 3 of 4 ACUs (CDACU, GNACU, WDACU), one of two FTACUs, and one of two RDTs operational. Block E: Must have both CACUs operational, one of two FTACUs, and one of two RDTs operational.
8. Required for specific weapons test/training missions
9. Required for specific ECM test/training missions
10. Special instrumentation is test specific

Attachment 30 (Added)

B-2A MINIMUM ESSENTIAL SUBSYTEMS LIST

B-2A Minimum Essential Subsystems List (MESL)				BSL	
NO.	**WUC**	**SYSTEM/SUBSYSTEM**	**FSL**	**DTE**	**DTS**
1	11000	Airframe	X	X	X
2	11***	Low Observables	X	X[1]	
3	12000	Cockpit and Fuselage Compartments	X	X	X
4	13000	Landing Gear System	X	X	X
5	14000	Flight Control System	X	X	X
6	16000	Ejection System	X	X	X
7	23000	Propulsion Systems	X	X	X
8	23PB*	Aft Tailpipe Assembly	X	X	X
9	24000	Auxiliary Power Unit System	X	X[2]	X[2]
10	24M**	Airframe Mounted Accessory Drive (AMAD)	X	X	X
11	41000	Air Conditioning and Pressurization	X	X	X
12	42000	Electric Power Supply	X	X	X
13	42HC*	PLTZ	X		
14	44A**	Crew Compartment Lights	X	X[3]	X[3]
15	44D**	Exterior Lighting	X	X[4]	X[4]
16	45000	Hydraulic System	X	X	X
17	46000	Fuel System	X	X	X
18	46Q**	Fuel Measurement/Management System	X	X	X
19	47000	Oxygen System	X	X	X
20	49000	Miscellaneous Utilities (Fire Protection System etc..)	X	X	X
21	51000	Instruments	X	X[4]	X[4]
22	51A**	Controls and Displays	X	X[5]	X[5]
23	51C**	Warnings, Cautions, and Advisory System (WCA)	X	X	X
24	52000	Flight Management	X	X	X
25	55000	Malfunction Analysis and Recording Equip	X	X	X
26	61A**	High Frequency Radio	X		
27	63A**	VHF and UHF Systems	X	X[6]	X[6]
28	64A**	Interphone System	X	X	X
29	68A**	AFSATCOM	X	X[7]	
30	71A**	Instrument Landing System (ILS)	X	X	X
31	71B**	Identification Friend or Foe (IFF)	X	X	X
32	71C**	Tactical Air Navigation System (TACAN)	X	X	X
33	71D**	KU-Band	X	X[7]	
34	71E**	X-Band	X	X[7]	
35	72A**	Radar Altimeter Subsystem	X	X	X
36	72H**	Radar Set	X	X[7]	

37	73A**	AINS	X	X[8]	X[8]
38	73B**	Inertial Navigation System (INS)	X	X[8]	X[8]
39	73D**	Global Positioning System (GPS)	X	X	X
40	75000	Weapons Delivery	X	X[7]	X[7]
41	76000	Defensive Management System (ZSR-63/ZSR-61)	X	X[7]	X[7]
42	97000	Explosive Devices and Components	X	X	X
43		Special Instrumentation (SI)	X	X[9]	

NOTES:

1. Required for LO specific testing.
2. One operable APU required.
3. Cockpit utility lights not required.
4. As required by AFI 11-202V3.
5. Three (3) operational MDUs per crew position.
6. Need one operable UHF or VHF radio, may require both for test mission. (ARC-164 radio must be operational if installed)
7. May be required by specific test mission.
8. Either AINS or INS must be operational.
9. Special instrumentation is test mission specific.

Attachment 31 (Added)

B-52H MINIMUM ESSENTIAL SUBSYTEMS LIST

B-52H Minimum Essential Subsystems List (MESL)				BSL	
NO.	**WUC**	**SYSTEM/SUBSYSTEM**	**FSL**	**DTE**	**DTS**
1	11***	Airframe	X	X	X
2	12A/B***	Ejection System	X	X	X
3	12D***	Control Stowage System	X	X	X
4	12F/H/J***	Relief Station/Equipment System/ANC Crew Seat	X		
5	12G***	Aisle Curtains	X		
6	12GA/K***	Thermal Curtains/PLTZ	X		
7	13***	Landing Gear System	X	X	X
8	14***	Flight Control System	X	X	X
9	23***	Turbojet Powerplant	X	X	X
10	24***	Starter Cartridge/Pneumatic	X	X	X
11	41***	Air Conditioning, Pressurization, Surface Ice Control	X	X	X
12	42***	Electrical Power Supply	X	X	X
13	44A***	Aircraft Lighting	X	X [1]	X [1]
14	45***	Hydraulic System/Pneumatic System	X	X	X
15	46***	Fuel System	X	X	X
16	47***	Oxygen System	X	X	X
17	49 B/D***	Miscellaneous Utilities	X	X	X
18	49 F***	EVS Window Wash	X		
19	51A***	Flight Instruments	X	X	X
20	51B***	Fuel Quantity	X	X	X
21	51C***	Miscellaneous Instruments	X	X	X
22	51D***	Pitot Static Systems	X	X	X
23	51E***	Engine Instruments	X	X	X
24	52***	Autopilot	X	X	X
25	60A***	MRT	X	X[2]	
26	61***	HF Radio	X		
27	62***	VHF Communications	X	X[3]	X[3]
28	63***	UHF Communications	X	X[3]	X[3]
29	64***	Intercommunication System	X	X	X
30	65***	Identification Friend or Foe	X	X	X
31	69***	Miscellaneous Communications (KY-58)	X	X[2]	X
32	71***	Radio Navigation	X	X	X
33	71G***	HSI/ADI	X	X	X
34	72D***	Radar Altimeter	X	X	X
35	72E***	Radar Beacon System	X	X[2]	X
36	73A***	Strategic Radar	X	X	X

37	73F***	AHRS	X	X	X
38	73G/K/L***	Bomb Nav Misc. Computers/Control and Display	X	X[2]	X[2]
39	73M***	Doppler Radar	X	X	X
40	73N***	Air Data Sensors	X	X	X
41	73P***	INS (RLG)	X	X	X
42	73Q***	Bomb Nav Digital Data Set	X	X[2]	X[2]
43	74***	Fire Control System	X	X	X
44	75***	Weapons Delivery System	X	X[2]	X[2]
45	76***	ECM Equipment (76J/M/N/P/R/T/W/Y)	X	X[2]	X[2]
46	77D/E***	Electro-Optical Viewing System (STV or FLIR)	X	X[2]	X[2]
47	77H***	EVS Airspeed Transducer	X	X[2]	X[2]
48	77J/L***	Data Presentation Group/AVTR	X	X[2]	X[2]
49	79***	Global Positioning System	X	X	X
50	93***	Drag Chute System	X	X	X
51	95***	Airborne Cooperational	X		
52	97***	Explosive Devices and Components	X	X	X
53		Special Instrumentation System	X	X[4]	
54		Analog Data Recorder		X[4]	
55		Digital Data Recorder (MARS 2/2E)		X[4]	
56		Telemetry System		X[4]	
57		IRIG Time Set		X[4]	
58		Flight Test Video Recorder		X[4]	
59		TSPI (ARDS, GAINR)		X[4]	

NOTES:

1. As required by AFI 11-202, Vol 3.
2. Test dependent. As determined by test director based on mission objectives.
3. Must have an operational UHF or VHF radio. May require both for test mission.
4. Special instrumentation is Development, Test, and Evaluation, and test support specific.

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